

Exhibit _ (JML-2A)

**Originally Filed As
Rebuttal Testimony and Exhibits of
Joseph M. Lynch
on Behalf of
South Carolina Electric & Gas Company in
Docket No. 2017-203-E**

REBUTTAL TESTIMONY

OF

JOSEPH M. LYNCH

ON BEHALF OF

SOUTH CAROLINA ELECTRIC & GAS COMPANY

DOCKET NO. 2012-203-E

Q. PLEASE STATE YOUR NAME AND OCCUPATION.

A. My name is Joseph M. Lynch and I am Manager of Resource Planning for South Carolina Electric & Gas Company ("SCE&G" or the "Company").

Q. DESCRIBE YOUR EDUCATIONAL BACKGROUND AND PROFESSIONAL EXPERIENCE.

A. I graduated from St. Francis College in Brooklyn, New York, with a Bachelor of Science degree in mathematics. From the University of South Carolina, I received a Master of Arts degree in mathematics, an MBA and a Ph.D. in management science and finance. I was employed by SCE&G as a Senior Budget Analyst in 1977 to develop econometric models to forecast electric sales and revenue. In 1980, I was promoted to Supervisor of the Load Research Department. In 1985, I became Supervisor of Regulatory Research where I was responsible for load research and electric rate design. In 1989, I became Supervisor of Forecasting and Regulatory Research, and in 1991, I was promoted to my current position of Manager of Resource Planning.

1 **Q. WHAT ARE YOUR CURRENT DUTIES AS MANAGER OF RESOURCE**
2 **PLANNING?**

3 A. As Manager of Resource Planning I am responsible for producing
4 SCE&G's forecast of energy, peak demand and revenue; for developing the
5 Company's generation expansion plans; and for overseeing the Company's load
6 research program.

7 **Q. HAVE YOU PREVIOUSLY TESTIFIED BEFORE THE PUBLIC SERVICE**
8 **COMMISSION?**

9 A. I have, on a number of occasions.

10 **Q. WHAT IS THE PURPOSE OF YOUR REBUTTAL TESTIMONY IN THIS**
11 **PROCEEDING?**

12 A. My testimony points out certain problems with the positions asserted by the
13 Sierra Club through the testimony of its witness Dr. Cooper. Specifically, I
14 support Mr. Marsh's testimony that points out the problems in the analytical
15 approach that Dr. Cooper uses. I provide further support for Mr. Marsh's
16 conclusion that natural gas prices are highly volatile, and that our knowledge of
17 future natural gas prices is too limited and uncertain to allow a utility to rely on a
18 single forecast of future prices in planning for future base load generation
19 capacity. All other considerations aside, I also show that because of the
20 investment that SCE&G has made to date in the V. C. Summer Nuclear Units 2
21 and 3 (the "Units"), going forward with construction of them is clearly superior
22 from a pure cost basis even assuming low natural gas prices.

1 **Q. DO YOU AGREE WITH MR. MARSH'S ASSESSMENT OF THE FLAWS**
2 **IN DR. COOPER'S ANALYSIS?**

3 A. I agree that Dr. Cooper's analysis is flawed for many reasons. Most
4 importantly, he looks only at one set of data as to future gas costs. This is not how
5 utility planning decisions are made. Mr. Marsh's testimony explains this very
6 well.

7 **Q. IN HIS DIRECT TESTIMONY DR. COOPER ARGUES THAT THE**
8 **"COLLAPSE OF GAS PRICES HAS BEEN DRAMATIC" AND THAT**
9 **THE EIA IS CURRENTLY PROJECTING NATURAL GAS PRICES TO**
10 **BE 62% LESS THAN SCE&G'S BASELINE PROJECTIONS IN THE 2008**
11 **CASE. SHOULD SCE&G ABANDON CONSTRUCTION OF ITS**
12 **NUCLEAR UNITS BECAUSE OF THIS?**

13 A. Of course not. The natural gas markets experience a great deal of volatility
14 in prices and planners see as much or more volatility in the projections of future
15 natural gas prices. In Exhibit No. __ (JML-1), I show a graph of EIA's current
16 natural gas price projections using data contained in their Annual Energy Outlook
17 ("AEO") 2012 forecast as well as that contained in their AEO 2009 forecast. The
18 2012 forecast is about 60% or so less than their 2009 forecast. So three years ago
19 the EIA did not foresee that a dramatic collapse in natural gas prices coming. By
20 the same token, EIA may not be able to foresee a dramatic reversal in prices in
21 another three years if that were coming.

1 **Q. DO YOU PUT MUCH CONFIDENCE IN THE EIA'S NATURAL GAS**
2 **PRICE PROJECTIONS?**

3 **A.** Planners, if they are prudent, do not put much confidence in anyone's
4 projection of natural gas prices. That is why almost all resource planning studies
5 involve scenario planning and sensitivity analysis around the most uncertain
6 drivers of cost. The price of fossil fuels is one of the most volatile and uncertain
7 drivers of energy costs. Each year the EIA publishes an analysis of the accuracy
8 of its natural gas price forecast. Exhibit No. __ (JML-2) shows a portion of EIA's
9 error analysis of its natural gas price projections, which shows the percent error in
10 their past forecasts. An important thing to notice in the table is that most entries
11 show sizable errors even in short term predictions and there is no entry with a 0%
12 error. This means that the EIA's forecast is almost always wrong. It is only a
13 question of how wrong.

14 **Q. DOES THE EIA PROVIDE SOME INDICATION OF THE**
15 **UNCERTAINTY SURROUNDING ITS NATURAL GAS PROJECTIONS?**

16 **A.** It does. The error analysis I just discussed provides one indication of
17 uncertainty. Another is a confidence interval that the EIA publishes with respect to
18 its projection of short-range prices. In Exhibit No. __ (JML-3), I show an EIA
19 chart containing a 95% confidence interval that EIA has computed around its
20 forecast of gas prices through 2013. This chart suggests the possibility of prices in
21 December 2013 reaching as high as \$7.76 per MMBTU and as low as \$2.11 with

1 an expected price of \$3.63. Clearly the EIA sees much uncertainty in its forecasts
2 of gas prices even in the next two years.

3 **Q. IS THE UNCERTAINTY IN NATURAL GAS PRICES BALANCED, THAT**
4 **IS, IS THE RISK OF HIGHER PRICES JUST AS GREAT AS THE RISK**
5 **OF LOWER PRICES?**

6 **A.** No, the risk of higher prices is much greater than the risk of lower prices.
7 Common sense and economics would suggest that natural gas producers would not
8 produce and sell gas at a loss, at least not for very long, so there is a floor on how
9 low gas prices can go. On the other hand, experience tells us that, if there is a
10 ceiling, it is fairly high. The unbalanced nature of price risk for natural gas can be
11 demonstrated in EIA's confidence interval I just discussed. The upper bound of
12 the 95% confidence interval is 214% greater than the mean forecast while the
13 lower bound is 42% lower. This means that there is an equal probability of prices
14 being 214% higher as there is of them being 42% lower than the expected price.
15 Clearly the upside risk is greater.

16 **Q. ARE THERE ECONOMIC FORCES THAT WOULD TEND TO PUSH**
17 **NATURAL GAS PRICES HIGHER?**

18 **A.** Yes. There are two categories of factors that come to mind: supply and
19 demand forces and environmental regulations. As to supply and demand, natural
20 gas prices are low now because of an abundance of supply being provided by the
21 new production technology of hydraulic fracturing, or fracking. Because of the
22 low prices, the demand for natural gas is increasing and this will put upward

1 pressure on the price. For example, natural gas generation is displacing a high
2 percentage of coal generation in the day-to-day dispatch of generating systems
3 throughout the country. This will tend to push the cost of gas generation toward
4 the cost of coal generation, which in today's market is higher. In the longer term,
5 there are gas exporters seeking authority to build liquefaction capacity to sell
6 domestically produced natural gas in the international market.¹ Today, U.S. prices
7 for natural gas are much lower than prices internationally.² If export sales
8 increase, this will increase demand for domestically produced natural gas. A high
9 level of exports would link domestic prices more closely to the global energy
10 market and global prices. Furthermore, low gas prices in the United States are
11 leading to expansion in gas-intensive industries like petrochemicals,
12 pharmaceuticals and other businesses that use gas as a chemical feedstock or
13 energy source.³

14 As to environmental regulations, the effect of environmental regulations
15 will take at least two forms. Recently promulgated EPA air emissions regulations,
16 such as those Mr. Byrne discusses, are forcing the early retirement of coal capacity
17 which cannot economically be scrubbed. Given the cost of carbon sequestration,
18 newly issued CO₂ regulations have taken new coal generation off the table as a

¹ Project sponsors are seeking Federal approval to export domestic natural gas" April 24, 2012, <http://www.eia.gov/todayinenergy/detail.cfm?id=5970/>.

² Id.

³ Accenture, North America Flexes its Manufacturing Muscle, http://www.accenture.com/us-en/outlook/Pages/outlook-journal-2012-north-america-flexes-industrial-muscle.aspx?c=mc_myoutlook3-_10000009&n=emc_0712

1 means for meeting future electric demand. Electric utilities will be meeting much
2 of their future capacity needs through the addition of new gas fired generation.
3 This will increase the demand for natural gas and put still more upward pressure
4 on gas prices. Increasing reliance of natural gas as a fuel for electric generation
5 will also create the need for new pipeline capacity to deliver gas in the required
6 volumes, which involves construction and permitting costs and risks, which can
7 lead to higher costs. Of course, if you burn gas, you emit carbon, so another risk of
8 gas generation is the risk that CO₂ costs will be imposed directly on gas as a fuel.

9 The other form of regulation deals with the technique of fracking. There is
10 concern in the environmental community that the technique is harmful to the
11 environment and requires more regulation. Such regulations would increase the
12 cost of producing natural gas and as a result would also increase the price of gas in
13 the market. How these developments will progress is uncertain, but they indicate
14 that there are forces at work in the economy that could cause today's forecasts of
15 future gas prices to prove inaccurate.

16 **Q. WHY DO YOU SAY THAT COAL IS "OFF THE TABLE" FOR**
17 **ELECTRIC GENERATION TODAY?**

18 A. On May 27, 2012, the Environmental Protection Agency issued new
19 regulations based on a finding that CO₂ should be regulated as an air pollutant.
20 The new regulations require all new or refurbished electric generation facilities to
21 meet CO₂ discharge limits which are based on the expected emissions from a
22 combined-cycle natural gas generation unit. This means that given current state of

1 carbon sequestration technology, new coal generation or refurbished coal plants
2 are not likely to be permitted for operation in the United States. Apart from
3 nuclear generation, there is now only one type of dispatchable base
4 load/intermediate load generation resource that can be built in most of the United
5 States. That is combined-cycle gas generation.

6 **Q. DR. COOPER ESTIMATES THAT THE LOW GAS PRICES**
7 **CURRENTLY PROJECTED BY THE EIA IMPLIES A \$115 MILLION**
8 **REDUCTION IN THE LEVELIZED COST OF A NATURAL GAS FIRED**
9 **GENERATION STRATEGY AND THAT SCE&G SHOULD THEREFORE**
10 **ABANDON THE CONSTRUCTION OF ITS NUCLEAR UNITS FOR**
11 **ECONOMIC REASONS. DO YOU AGREE?**

12 **A.** Absolutely not. I have demonstrated that there is a great deal of uncertainty
13 in natural gas prices and in their projection. Prudent resource planning decisions
14 cannot be made based on a single scenario of natural gas price projections. I have
15 also shown that the likelihood of higher gas prices is much greater than that of
16 likelihood of lower gas prices. Therefore, there is a greater likelihood that the
17 \$115 million advantage that Dr. Cooper calculates will decrease or disappear than
18 that this advantage will get larger.

19 **Q. FOR THE SAKE OF ARGUMENT ASSUME THAT SCE&G PUTS ASIDE**
20 **THE PRUDENT PRACTICE OF USING SCENARIO PLANNING AND**
21 **SENSITIVITY ANALYSIS IN RESOURCE PLANNING STUDIES AND**
22 **ACCEPTS DR. COOPER'S APPROACH OF USING ONE SCENARIO OF**

1 **LOW GAS PRICES OVER 40 YEARS TO MAKE PLANNING**
2 **DECISIONS. WOULD YOU AGREE BASED ON THE RESULTING**
3 **ECONOMICS THAT SCE&G SHOULD ABANDON ITS NUCLEAR**
4 **CONSTRUCTION AND BUILD NATURAL GAS FIRED GENERATION?**

5 **A.** Absolutely not. Assuming that natural gas prices will be low for the next 40
6 years and further assuming that Dr. Cooper is correct in his calculation that this
7 results in a \$115 million reduction in the levelized cost of a natural gas generation
8 strategy, you still need to look at those important drivers of cost that have changed
9 related to the nuclear generation strategy going forward.

10 **Q. PLEASE EXPLAIN.**

11 **A.** At least two changes have occurred since the original studies were run that
12 would make a material difference in the cost of the nuclear strategy. One relates to
13 the cost of the Units. In his direct testimony Mr. Byrne notes that the projected
14 cost of the nuclear construction is about 8.7% or \$551 million lower than the
15 forecasts on which the original studies were run. Over a 40-year period, the
16 levelized carrying cost of investing in nuclear generation is 16%. This means that
17 on a levelized basis, every dollar invested in the Units equates to \$0.16 per year in
18 capital related costs on average during the 40-year period. This levelized carrying
19 cost includes all the costs of carrying the nuclear investment, including
20 depreciation, taxes, insurance, interest and so forth. Using a 16% levelized
21 carrying charge for nuclear investments, and applying it to the \$551 million
22 reduction in the cost of the Units we are now forecasting, we can compute the

1 difference that this reduction in cost makes to the levelized cost of the nuclear
2 generation strategy. The result is that because of the \$551 million reduction in the
3 construction cost forecast, the levelized cost of nuclear generation is reduced by
4 about \$88 million ($\$551 \text{ million} * 0.16\%$) per year over the 40 year planning
5 horizon for the study.

6 Furthermore it is well recognized in utility planning practice that when
7 making decisions about investments going forward, it is only the going-forward
8 costs that are relevant. These are the costs that are left to be spent. If the question
9 is whether or not SCE&G should complete the nuclear Units, only the cost of
10 completing the Units is relevant.

11 In Exhibit 1 of her testimony, Ms. Walker reports that about 25% of the
12 construction costs for the Units have already been spent and 75% remain to be
13 spent to complete the project. This means that the levelized cost of the nuclear
14 generation scenario should be reduced by \$230 million ($\$5,762 \text{ million} * 0.16 * 0.25$), where \$5,762 million is the current cost of the Units, 25% is the amount that
15 has been spent and 16% is the levelized carrying cost of nuclear investment. Thus
16 to update the 2008 study to current conditions, the levelized cost of the nuclear
17 generation strategy should be reduced by a total of \$318 million to reflect the fact
18 that the cost of the Units has declined by \$551 million and only 75% of that lower
19 cost remains to be spent.
20

1 **Q. WHAT ABOUT THE ADDITIONAL COSTS THAT SCE&G MIGHT**
2 **HAVE TO PAY TO ITS CONTRACTORS AND OTHERS TO ABANDON**
3 **THE UNITS AT THIS TIME?**

4 **A.** As Mr. Byrne discusses, SCE&G would have to pay additional costs to its
5 contractors and others to abandon construction of the Units and switch to a gas
6 strategy. Those costs have not been quantified. But at this point in the project,
7 incurring them would be a necessary part of moving to a gas strategy. Because
8 these costs are not included in my analysis, it understates the advantages that the
9 nuclear strategy has over gas to that extent. But this would only cause the
10 advantage of nuclear strategy to go up. The cost of abandonment would increase
11 the value of continuing with nuclear construction compared to switching to a gas
12 strategy.

13 **Q. WHAT THEN IS YOUR CONCLUSION BASED ON THE UPDATED**
14 **ECONOMICS?**

15 **A.** The economics clearly demonstrate that the nuclear construction should
16 continue. Given current capital cost forecasts and the value of investment to date,
17 the levelized cost of the nuclear generation strategy is reduced by \$318 million.
18 Even if the levelized cost of the gas generation strategy is reduced by \$115 million
19 as Dr. Cooper suggests, the nuclear strategy maintains its economic advantage by
20 a wide margin.

21 **Q. WHICH ADJUSTMENT DO YOU CONSIDER THE MOST RELIABLE --**
22 **DR. COOPER'S ADJUSTMENT OF \$115 MILLION BASED ON AN**

**ASSUMPTION OF LOW GAS PRICES OVER THE NEXT 40 YEARS OR
THE \$318 MILLION ADJUSTMENT BASED ON THE NUCLEAR
CONSTRUCTION COSTS?**

A. I have much more confidence in the \$318 million adjustment than the \$115 million. More than two-thirds of the cost left to be spent under the EPC contract are fixed or subject to fixed escalation rates. Of course the 25% of the cost of the Units that has already been spent is fully known and measurable. On the other hand, I have already discussed the volatility and uncertainty of prices in the natural gas market. The \$115 million adjustment to the natural gas generation strategy is based on an assumption of low gas prices over the next 40 years which is very uncertain. All indications are that the uncertainty of the gas price forecast is much greater than the uncertainty surrounding the cost of completing the construction cost of the Units.

**Q. DR. COOPER TESTIFIES THAT THE COST OF THE NATURAL GAS
GENERATION STRATEGY COULD BE REDUCED BY AS MUCH AS
\$200 MILLION IF A ZERO COST FOR CO₂ EMISSIONS IS ASSUMED IN
ADDITION TO LOW NATURAL GAS PRICES. HAVE YOU
CONSIDERED THIS IN YOUR ANALYSIS?**

A. In its 2008 studies, SCE&G had assumed in its base case scenario a cost of \$15 per ton of CO₂ emitted which gave the nuclear strategy an \$88 million advantage over the natural gas generation strategy in levelized costs.

1 Dr. Cooper testifies at one point that if a zero cost per CO₂ ton is assumed,
2 then the \$87 million could be added to the \$115 million discussed above thereby
3 producing a \$200 million reduction in levelized costs for the natural gas
4 generation strategy. However, Dr. Cooper subsequently testifies that the
5 Commission cannot “ignore the carbon issue” so I assumed that his discussion
6 about a \$200 million reduction was meant more as commentary than serious
7 economic analysis.

8 **Q. CAN THE COMMISSION IGNORE THE CARBON ISSUE?**

9 **A.** I agree with Dr. Cooper that the Commission cannot ignore the carbon
10 issue. The EPA has ruled that CO₂ emissions endanger human health, and the U.S.
11 Supreme Court has ruled that under the Clean Air Act if the EPA makes such an
12 endangerment finding, then it must regulate CO₂ emissions. Carbon emission
13 cost, by the way, can come as taxes, cap and trade mechanisms, or mandatory
14 capture and sequestration requirements. Each of these approaches imposes costs.
15 For purpose of our studies, what form these costs takes is not particularly
16 important.

17 **Q. ASSUME FOR ARGUMENT SAKE THAT THE EPA REVERSES ITS**
18 **ENDANGERMENT FINDING AND THAT THE COST OF CO₂ EMISSION**
19 **IS ZERO IN THE FUTURE AND ASSUME FURTHER THE NATURAL**
20 **GAS PRICES STAY LOW OVER THE NEXT 40 YEARS AND**
21 **CONSEQUENTLY THAT THE NATURAL GAS GENERATION**
22 **STRATEGY IS \$200 MILLION LESS RELATIVE TO THE NUCLEAR**

**STRATEGY IN LEVELIZED COSTS. BASED ON ECONOMICS SHOULD
SCE&G ABANDON THE NUCLEAR CONSTRUCTION AND BUILD GAS
FIRED PLANTS UNDER THESE ASSUMPTIONS?**

A. Absolutely not. First I should repeat that important resource planning decisions should be based on thorough studies using scenario planning and sensitivity analysis. All that Dr. Cooper's analysis demonstrates is that scenarios can be imagined in which gas might be more economical than nuclear. Even accepting Dr. Cooper's approach, which I cannot do, SCE&G should not abandon the nuclear construction because, as already discussed, updated information on construction costs show at least a \$318 million reduction in the cost of the nuclear strategy based on where we stand today. Even when compared to the \$200 million reduction for the natural gas strategy which Dr. Cooper puts forward, and which even he does not seem to fully accept, the economic advantage of the nuclear strategy remains.

**Q. DR. COOPER MENTIONS A SAVINGS OF \$4 BILLION AND POSSIBLY
AS MUCH AS \$8 BILLION ASSOCIATED WITH HIS ANALYSIS. WHAT
DO THESE NUMBERS REPRESENT AND HOW DO THEY RELATE TO
THE LEVELIZED COSTS THAT YOU HAVE BEEN DISCUSSING?**

A. While Dr. Cooper does not specify how he made his calculation, it seems that his \$8 billion number was calculated as the product of 40 years times the annual average levelized savings of \$200 million. He makes a similar calculation based on his \$115 million levelized savings assertion, and calculates a \$4 billion

1 savings. This is not how this calculation would be made in the planning context.
2 The approach that would be used in the planning context would be to compute a
3 present value which is a standard calculation used in economic analysis to
4 determine the accumulated present value of a future revenue stream.

5 **Q. PLEASE EXPLAIN.**

6 **A.** The accumulated present worth of a future revenue stream gives you the
7 value today of a stream of payments or savings going out into the future. The
8 calculation uses a present value factor that is typically calculated using the cost of
9 capital for the entity in question. Using a weighted cost of capital of 8.7%, which
10 is SCE&G's actual weighted average cost of capital as of December 31, 2011, the
11 accumulated present value factor for a 40-year levelized stream of dollars is 12.05.
12 Thus the accumulated present value for the \$200 million levelized stream is \$2.4
13 billion ($12.05 \times \$200$ million) not \$8 billion. A similar calculation can be made for
14 Dr. Cooper's levelized savings calculation of \$115 million. In this case the
15 accumulated present value is \$1.4 billion ($12.05 \times \115 million) as opposed to the
16 \$4 billion reported by Dr. Cooper.

17 **Q. HOW WOULD YOUR NUMBERS REFLECTING INCREASED SAVINGS FOR**
18 **THE NUCLEAR STRATEGY COMPARE ON A PRESENT VALUE BASIS?**

19 **A.** I computed an increase in the levelized savings for the nuclear strategy of
20 \$318 million resulting from the reduced capital costs of completing the nuclear
21 Units. The present value of this amount over the planning horizon is \$3.9 billion,
22 which compares to the present value of Dr. Cooper's asserted savings for the gas

strategy (\$115 million levelized with \$15 CO₂ costs) of \$1.4 billion. Even accepting Dr. Cooper's assumptions as to future gas prices, the cost reduction he computes in the gas strategy is less than half the saving in the nuclear strategy. Compared to \$200 million in levelized savings that Dr. Cooper computed, which he admits improperly assumes no CO₂ costs, the results are \$2.4 billion in savings for the gas strategy compared to \$3.9 billion in savings for the nuclear strategy. Even assuming no CO₂ costs, nuclear savings are still over 60% greater than the savings for gas. Clearly, at this point in the project continuing construction of the nuclear Units is more economical by a very wide margin than abandoning them and pursuing a natural gas strategy. The comparisons are set out in the Chart A, below.

Chart A

Dr. Cooper's Adjustments to Natural Gas Strategy Costs (reduced costs, in millions)		SCE&G's Adjustments to Nuclear Strategy Costs (reduced costs, in millions)	
<u>Low Gas Cost</u>		<u>Going-Forward Cost</u>¹	
Levelized Per Year	\$115	Levelized Per Year	\$318
Accumulated	\$4,000	Accumulated	- ²
Present Value	\$1,400	Present Value	\$3,900
<u>Low Gas Cost & No CO₂ Cost</u>			
Levelized Per Year	\$200		
Accumulated	\$8,000		
Present Value	\$2,400		

¹ Reflecting reduced construction cost of \$551 million and the fact that 25% of the reduced cost of the project has already been spent.

² Not computed.

1 **Q. DOES SCE&G SEE AN ADVANTAGE TO ITS NUCLEAR GENERATION**
2 **STRATEGY THAT GOES BEYOND THE ECONOMIC ISSUES**
3 **BROUGHT UP BY DR. COOPER AND ADDRESSED IN YOUR**
4 **TESTIMONY?**

5 **A.** Yes, it does. Under its nuclear strategy SCE&G will achieve a balanced
6 mix of capacity. In 2019 SCE&G will have 31% nuclear generation, 28% natural
7 gas and 27% coal. This puts SCE&G in a good position to protect its customers
8 and mitigate the cost impacts from the volatility of fossil fuel prices and the
9 uncertainty of future environmental regulations on fossil fuels.

10 **Q. DOES THAT CONCLUDE YOUR TESTIMONY?**

11 **A.** Yes, it does.

EXHIBIT NO. __ (JML-1)

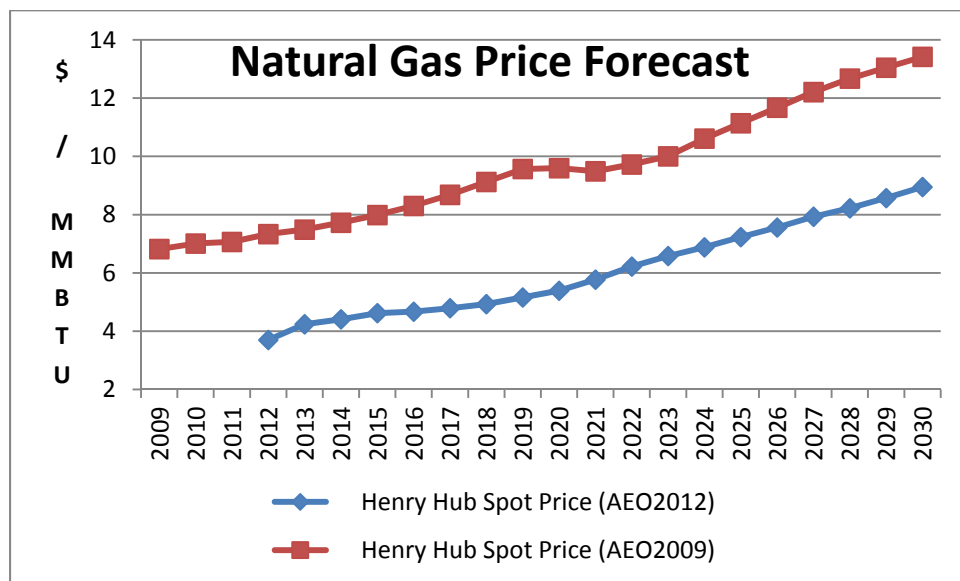


EXHIBIT NO. __ (JML-2)

**Projected vs.
actual**
(percent
difference)

	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
AEO 1994	-19.0	-21.5	13.4	-26.4	-29.5	-42.9	-29.4	-21.4	-33.6	51.5	43.3
AEO 1995	-30.2	-27.6	7.1	-27.1	-29.1	-41.8	-28.6	-22.4	-35.3	47.5	36.1
AEO 1996	-40.4	-42.8	-19.4	-49.3	-52.6	-62.9	-55.6	-52.5	-60.9	-10.2	-16.2
AEO 1997	-43.9	-46.6	-25.0	-52.5	-55.5	-65.3	-58.5	-55.7	-63.9	-18.3	-25.2
AEO 1998	-37.2	-40.5	-17.1	-48.4	-52.5	-63.3	-56.3	-53.2	-61.6	-12.7	-19.5
AEO 1999	-40.1	-42.1	-17.8	-48.1	-51.8	-62.4	-54.6	-51.7	-60.8	-11.9	-19.5
AEO 2000	-39.3	-43.3	-21.4	-50.9	-54.0	-63.7	-56.0	-52.5	-61.1	-12.9	-21.0
AEO 2001	-7.8	-12.9	0.8	-43.9	-50.5	-61.4	-53.9	-51.0	-60.2	-11.3	-19.4
AEO 2002		0.6	-30.1	-48.1	-47.9	-59.0	-51.0	-48.3	-57.4	-4.2	-12.3
AEO 2003			-5.6	-33.2	-42.8	-57.1	-50.8	-47.1	-56.0	0.9	-5.0
AEO 2004				1.9	-26.8	-49.3	-41.7	-38.2	-48.9	8.2	-4.0
AEO 2005					-1.4	-24.7	-22.6	-26.9	-46.9	14.8	0.5
AEO 2006						6.5	12.1	4.4	-21.3	61.4	36.7
AEO 2007							7.5	12.1	-11.3	80.2	53.8
AEO 2008								1.9	-13.8	95.5	64.5
AEO 2009									1.1	12.2	15.7
AEO 2010										-7.9	0.2
AEO 2011											-1.0
Average Absolute Percent Difference	32.2	30.9	15.8	39.1	41.2	50.8	41.3	36.0	43.4	27.2	21.9

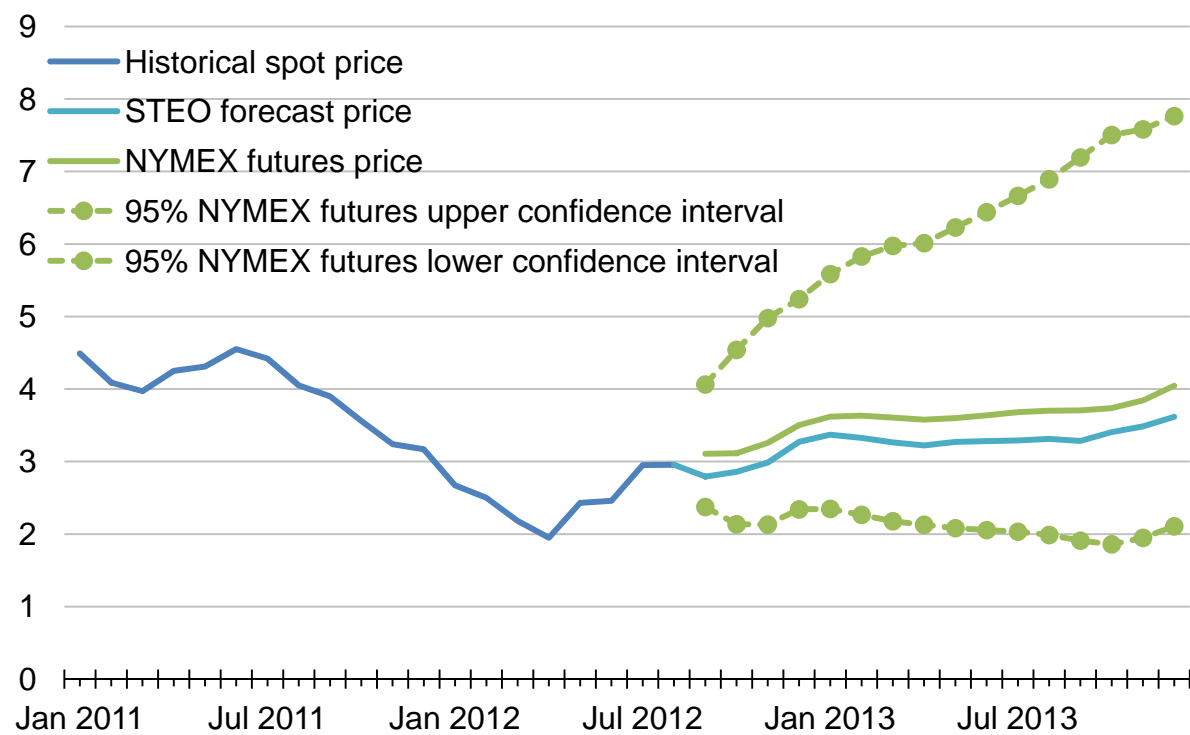
Sources: Projections: *Annual Energy Outlook*, Reference Case Projections, Various Editions.

Historical Data: U.S. Energy Information Administration, Annual Energy Review 2010, DOE/EIA-0384(2010) (Washington, DC, October 2011) Table 6.7.

EXHIBIT NO. __ (JML-3)

Henry Hub Natural Gas Price

dollars per million btu



Source: Short-Term Energy Outlook, August 2012

